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Specification

Rotating Member of a Printing Press, Comprising a Bale

The invention relates to a rotating body with a barrel of a printing press in accordance with the preamble of claim 1 or 7.

Cylinders of a printing group embodied as hollow bodies are known from DE 41 19 824 C1 and DE 41 19 825 C1, wherein the cylinder consists of a one-piece cast body forming an outer body and, if required, additionally has an inner one-piece rotationally-symmetrical cast body, wherein both cast bodies consist, for example, of cast steel or gray cast iron and, in the case of DE 41 19 824 C1, are made of one piece by means of connecting strips, or are welded together.

A cylinder of a printing group made of gray cast iron is known from DE 42 12 790 A1 wherein, for increasing the flexural strength, an axially extending steel core has been cast centered in the cylinder, which at the same time projects as a shaft journal from the faces of the cylinder, wherein the gray cast cylinder encloses the steel core concentrically and has hollow spaces.

A cylinder of a printing group consisting of a base body of gray cast iron or cast light alloy is known from DE 196 47 067 A1, wherein a preferably hollow designed cylinder core is cast into the base body as a stiffening means. The cylinder core consists, for example, of a steel tube. Further profiled reinforcement elements extending parallel with the axis of rotation of the cylinder and having a solid

or a hollow cross section, possibly with an uneven wall thickness, are arranged in a radially outside located area of the base body, are distributed over the circumference of this area, and have preferably been brought as closely as possible to the shell face of the base body. The stiffening means and all profiled reinforcement elements are closed at their respective ends and are completely enclosed by the cast material of the base body.

A double-shell cylinder which can be temperature-regulated is known from the patent documents DE 861 642 B and DE 929 830 B, wherein a heating or cooling medium, preferably air, is conducted over a helical course inside the double cylinder shell, wherein the interior cylinder and the exterior cylinder are arranged at a radial distance of approximately 10 to 20 mm from each other.

A counter-pressure cylinder which can be temperature-regulated is known from DE 20 55 584 A, which has heating chambers inside its shell over the entire cylinder width, which are connected to a warm water circuit by means of a feed line, arranged axially in a cylinder journal, and a discharge line, which is conducted coaxially in respect to the feed line.

A printing forme cylinder which can be temperature-regulated is known from DE 37 26 820 A1, whose interior is completely filled with a fluid, wherein the fluid passes through a first circuit extending outside of the printing forme cylinder, wherein a preferably coil-shaped cooling tube penetrates the fluid over the entire width of the cylinder, wherein a cooling medium flowing through the cooling tube,

which is connected to a second circuit, cools the fluid and therefore the cylinder.

A cylindrical rotating body for printing presses, which can be temperature-regulated by means of the introduction of water vapor, is known from DE 93 06 176 U1, in which bores or lines extending underneath and close to its shell face along the rotating body are arranged, wherein the bores or lines can have a course different from being axially parallel, and therefore drop, for example towards the center of the rotating body.

A cylindrical rotating body for printing presses which can be temperature-regulated is known from DE 195 10 797 A1, wherein a coolant in only one circuit flows through the entire interior, and is equipped on one side with a coolant supply and a coolant removal device arranged in a cylinder journal and connected with a rotary transmission leadthrough.

A printing forme cylinder which can be temperature-regulated is known from DE 199 57 943 A1, which has cast core chambers in its interior, which extend over the width of the cylinder and are closed off at the faces by covers, wherein a tube extending over the width of the cylinder is arranged in each chamber, wherein a sealingly displaceable tube unit, which is connected with a rotary transmission leadthrough for supplying and removing a coolant, has been inserted into each tube, wherein each tube is connected via a radial bore with the tube unit at the front of the cylinder which is equipped with the tube unit, wherein supplied coolant flows through the tubes and empties into the hollow cast core chambers in the area of the oppositely located front of the cylinder and

from there is removed via a radial bore connected with the tube unit.

A cylinder for a rotary printing group which can be temperature-controlled and is embodied with approximately full walls is known from EP 0 557 245 A1, which has a first line along its axis of rotation and, closely underneath its shell face, several lines, which are connected with the first line, are preferably arranged at equal distances in the circumferential direction and extend parallel with the axis of rotation, through which a fluid for regulating the temperature of the shell face can flow.

A cylinder for a rotary printing group which can be temperature-controlled is known from EP 0 652 104 A1, which has a cylinder shell tube, at each end of which a flange is arranged, wherein a separation tube and a supply tube extend in the interior of the cylinder coaxially in respect to its length, wherein a hollow space between the separation tube and the cylinder shell tube forms a cooling chamber, through which coolant fed in by the supply tube flows, wherein the line in the separation tube is connected with the cooling chamber via connecting bores in one of the flanges.

A cylinder for a rotary printing group which can be temperature-controlled is known from WO 01/26902 A1 and WO 01/26903 A1, which has a tube-shaped or solid base cylinder body, which is surrounded by a tube-shaped outer cylinder body, wherein a conduit through which temperature-control fluid can flow is formed on the circumference of the base cylinder body, or in a gap between the base cylinder body and the outer cylinder body, wherein the conduit can, for example, be embodied as an open gap with a circular profiled

head space, or as a continuous groove helically extending in the axial direction of the cylinder.

A roller for printing presses is known from DE 28 53 594 C2, which has a cast base body of polyamide as the barrel and a shaft arranged centered in it, a conduit for a temperature-regulation medium, which leads into the barrel, is provided in the conduit.

A forme cylinder of a flexographic printing press with two half-shell-shaped saddle plates, which are screwed to the forme cylinder, is known from DE 84 36 119 U1, wherein the end areas of flexographic printing plates are held on the forme cylinder at respective clamping strips arranged between the saddle plates, wherein each clamping strip is screwed to an insert strip attached to the forme cylinder.

A sheet guidance drum for sheet-fed rotary printing presses is known from DE 39 02 923 C2, wherein a support plate, which is supported by several elastically acting carrier elements or supports, is arranged on a deflection drum, wherein the carrier elements or supports are placed at an inclination in respect to the deflection drum, and wherein a radial height of the support plate provided by the carrier elements or supports can be adjusted, in particular reduced, by means of the clamping of a shell foil resting on the support plate, which is directed in the circumferential direction of the deflection drum.

A rubber blanket cylinder for an offset printing press is known from DE 34 41 175 C2, wherein a rubber blanket clamped on the rubber blanket cylinder extends over a recess provided as a relief device in the rubber blanket cylinder.

The object of the invention is based on creating rotating bodies with a barrel of a printing press.

In accordance with the invention, this object is attained by means of the characteristics of claims 1 or 7.

The advantages to be attained by means of the invention consist in particular in that a hollow space in the barrel of the rotating body can be produced in a simple manner and that, in connection with a preferred embodiment of the rotating body as a forme cylinder or a transfer cylinder, if a temperature-regulation medium flows through the hollow space, the access to a holding device embodied in the barrel for holding a dressing arranged on the shell face is not hampered. In this case the rotating body, in particular its barrel, can be produced in a simple manner, for example also by means of casting technology. An exterior body embodied in several parts can be applied to the surface of the base body in a simple manner without it being necessary to exactly fit the base body and the exterior body together, for example by coaxially pushing them together. A shaft made of a high-strength material and introduced centered into the barrel or its base body permits a conduit of a large cross section for the inflow and outflow of the temperature-regulation medium and therefore the throughput of a larger volume flow without having to increase the exterior dimensions of the rotating body for maintaining the same strength values. By means of the proposed geometric design of the hollow spaces used as flow conduits it is possible to maintain the effect of the temperature-regulation medium approximately constant during its flow through the rotating body. A thermal insulation of

the temperature-regulation medium against the base body is particularly advantageous for increasing the effectiveness of the heat exchange between the temperature-regulation medium and the exterior body.

Exemplary embodiments of the invention are represented in the drawings and will be described in greater detail in what follows.

Shown are - in Figs. 1 to 7 respectively in longitudinal and in cross section - in:

Fig. 1, a rotating body of a printing press in accordance with a first embodiment, with axially extending hollow bodies,

Fig. 2, a rotating body of a printing press in accordance with a first embodiment, with a hollow body extending in a helical line,

Fig. 3, a rotating body of a printing press in accordance with a second embodiment, with an integrally cast body and having a conduit,

Fig. 4, a rotating body of a printing press in accordance with a third embodiment, with a base body and a solid exterior body applied thereto, wherein hollow spaces which are open toward the base body have been cut into the exterior body,

Fig. 5, a rotating body of a printing press in accordance with a variation of a third embodiment, with a base body and a solid exterior body applied thereto, wherein hollow spaces which are covered by the exterior body have been cut into the base body,

Fig. 6a, a rotating body of a printing press in accordance with a fourth embodiment, with a conduit formed between a base body and an exterior body,

Fig. 6b, a rotating body of a printing press in accordance with a fourth embodiment, with a conduit formed between a base body and an exterior body,

Fig. 7, a rotating body of a printing press in accordance with a fifth embodiment, with a shaft made of a high-strength material introduced into the barrel,

Fig. 8, an embodiment of a hollow body or conduit of a rotating body with a temperature-regulated shell face, wherein the heat exchange between the shell face and a temperature-regulation medium is constant.

A first embodiment of a rotating body 01 of a printing press is shown in Figs. 1 and 2. The rotating body 01 has a barrel 02, or a barrel 02 with a base body 17 wherein at least the base body 17 is made of a casting material, wherein the barrel 02, or its base body 17, has an axial length L, and in its outer area, i.e. closely underneath the shell face 07, has at least one tube-shaped hollow body 03, 04 enclosed in the casting material, and wherein the hollow body 03, 04 extends over the entire length L of the barrel 02, or its base body 17. In accordance with Fig. 1, the hollow body 03, 04 can extend, for example, parallel in respect to a longitudinal axis 06 of the rotating body 01 or - as represented in Fig. 2 - it can pass through the outer area of the barrel 02, or its base body 17, in a helical line from one face 11 to the oppositely located one. For improved understanding, in the longitudinal section of Fig. 2 the

helical-line-like course of the hollow body 03 has been drawn in dash-dotted lines. Regardless of its course, the hollow body 03, 04 forms a conduit, through which a temperature-regulation medium can flow, i.e. a flow medium for regulating the temperature of at least the shell face 07 of the barrel 02, wherein the temperature-regulation medium preferably is a fluid heat-conducting medium, such as water or an oil, for example.

For the introduction and removal of the flow medium into or from the barrel 02, the hollow body 03 can be connected with lines 08, 09, which are attached at the front side of, for example, the barrel 02, or can be attached there on a flange 36 in the form of an annular groove 37 (Fig. 2). Also, in the case of several hollow bodies 03, 04 arranged in the barrel 02, or its base body 17, these, as well as the lines 08, 09 connected with them, can advantageously have a common connector on one of the faces 11 of the barrel 02.

It is advantageous for good temperature regulation to arrange the contact face A07 relevant to the heat exchange of the hollow body 03, 04 closely, i.e. if possible only a few millimeters, preferably less than 20 mm, underneath the shell face 07 of the barrel 02. If several hollow bodies 03, 04 are arranged along the circumference U of the barrel 02, it is advantageous if the temperature-regulation medium flows in opposite directions through adjoining hollow bodies 03, 04. If several hollow bodies 03, 04 are provided in the outer area of the barrel 02, or its base body 17, it is advantageous to arrange all hollow bodies 03, 04 at the same radial distance a_3 , a_4 from the longitudinal axis 06 of the rotating body 01, as well as at even distances in the

direction of the circumference U of the barrel 02, so that as even a temperature regulation of the shell face 07 of the barrel 02 as possible can be achieved.

The hollow body 03, 04 in the rotating body 01 produced by means of casting technology has a narrow interior diameter D3, D4, wherein the interior diameter D3, D4 preferably is less than 25 mm, in particular between 15 mm and 20 mm. A conduit of such a narrow interior diameter D3, D4 can hardly be produced by casting technology by means of the insertion of a cast core into a barrel 02, or base body 17, to be produced, for which reason it has been attempted to drill such a conduit into the barrel 02 or its base body 17, however, over the length L of the barrel 02, or its base body 17, this is expensive and not without problems in technical execution.

It is therefore proposed in connection with the first embodiment of a rotating body 01, to place a tube-shaped hollow body 03, 04, i.e. a hollow body 03, 04 embodied as a tube, preferably a steel tube, into a casting mold for the barrel 02, or its base body 17, and to enclose it in the casting material. So that the tube-shaped hollow body 03, 04 does not become soft and is deformed because of being heated as a result of the effect of the temperature of the melted material of the barrel 02, or its base body 17, it is necessary to embody the hollow body 03, 04 with comparatively thick walls in respect to its interior diameter D3, D4, so that a wall thickness of the hollow body 03, 04 preferably is at least one-fifth of the interior diameter D3, D4. Thus, a suitable wall thickness of the tube-shaped hollow body 03, 04 preferably is at least 3 mm, in particular between 5 mm and 6

mm. Furthermore, the tube-shaped hollow body 03, 04 can also be fixed in place in the casting mold for the barrel 02, or its base body 17, and stabilized by means of support elements.

In accordance with Fig. 2, the barrel 02, or its base body 17, can be embodied as a hollow cylinder 02, into whose annular wall the tube-shaped hollow body 03, 04 is cast. The rotating body 01 can be employed in the printing press as a roller in an inking system or dampening system or, for example, as a cylinder 01 for conveying a material to be imprinted, or as a roller 01 for conveying a material to be imprinted.

If for example the rotating body 01 is embodied as a cylinder 01 of a printing group, this cylinder 01 can be designed, for example, as a forme cylinder 01 or as a transfer cylinder 01, wherein this cylinder 01 can be covered, for example, with one dressing or two dressings in the direction of its circumference U, and axially, i.e. over its length, with up to six dressings, for example. In connection with a forme cylinder 01 the dressings are mostly embodied as plate-shaped printing formes. In case of a transfer cylinder 01, the dressings are preferably rubber printing blankets applied to a support plate. As a rule, a plate-shaped printing forme, or a support plate for a rubber printing blanket, consists of a flexible, but otherwise dimensionally stable material, for example an aluminum alloy.

The printing group in which the previously mentioned cylinder 01 is employed can be designed as a nine-cylinder satellite printing unit, for example, in which four pairs, each consisting of a forme cylinder 01 and a transfer

cylinder 01, are arranged around a common counter-pressure cylinder, wherein at least the forme cylinders 01, for example, can each have the characteristics of the attainment of the object here proposed. Arrangements are advantageous for newspaper printing in particular, in which a forme cylinder 01 is covered in its axial direction with up to six side-by-side plate-shaped printing forms, and along its circumference U either with one plate-shaped printing forme, or with two plate-shaped printing formes one behind the other. Such a forme cylinder 01 rolls off on a transfer cylinder 01, which is axially covered with up to three side-by-side arranged rubber printing blankets, for example, wherein every rubber printing blanket covers the entire circumference U of the transfer cylinder 01. As a rule, the rubber printing blankets have twice the width and length of the plate-shaped printing formes used with the forme cylinder 01 which acts together with the transfer cylinder 01. Here, the forme cylinder 01 and the transfer cylinder 01 preferably have the same geometric dimensions in regard to their axial length and their circumference U. For example, a rotating body 01 embodied as a cylinder 01 has a diameter D2 of for example 140 mm to 420 mm, preferably between 280 mm and 340 mm. The axial length of the barrel 02 of the cylinder lies, for example, in the range of between 500 mm and 2400 mm, preferably between 1200 mm and 1700 mm.

The explanations provided here in regard to the design and employment of the proposed rotating bodies 01 should apply in a corresponding manner also to the embodiments described hereinafter.

As represented in Fig. 3, a second embodiment of the proposed rotating body 01 of a printing press can provide that at least one body 12 is arranged in the barrel 02 of the rotating body 01, or at least in a base body 17, made of a castable material, of the barrel 02 wherein, at least in a sectional view transversely to the axial direction of the rotating body 01, the body 12 is delimited by two peripheral faces A13', A13", which are spaced apart from each other in the radial direction of the rotating body 01 and are closed in themselves, wherein both peripheral faces A13', A13" end with their sides facing away from the body 12 at the material of the barrel 02, and wherein at least one conduit 14, 16, which extends in the axial direction of the rotating body 01 and is bordered by the material of the body 12, is formed in the interior 13 of the body 12.

In this case the body 12 can be embodied for example as a molded element produced by means of casting technology, i.e. a pre-formed component, wherein the molded element has at least one hollow space in its interior 13 for forming at least one conduit 14, 16. Alternatively, the body 12 can be a pressed or continuously cast product, for example. The body 12 consists of a solid material, wherein a hollow space is formed in this body, preferably near its peripheral face A13' oriented toward the shell face 07 of the barrel 02, wherein the hollow space is delimited by the material of the body 12 at least in the longitudinal direction of the latter. Preferably the body 12 is homogeneous and embodied to be of one piece, or also several pieces, in the direction of the circumference U of the rotating body 01.

Advantageously the body 12 is made of a heat-resistant material, for example of a ceramic material or a reinforced metal foam. Heat resistance is required so that the body 12 does not become deformed when it is surrounded by the molten material of the barrel 02 used for producing the rotating body 01. A placement of the body 12, which is simple in regard to production technology, into the barrel 02 of the rotating body 01 results, if at least the barrel 02, or its base body 17, consists of a casting material of, for example, metal, ceramic, glass or plastic, and the body 12 is cast into the barrel 02, or its base body 17, and enclosed by the casting material. During the manufacturing process of the rotating body 01, the body 12 can be placed for this purpose into the casting mold for casting the body 02, preferably in the outer area of the barrel 02, fixed in place, if needed, with the aid of support elements, and cast in, so that the body 12 is completely enclosed by the casting material of the barrel 02. With an annular embodiment of the body 12, the space it encloses is preferably filled with the casting material of the barrel 02, at least the body 12 is enclosed by the casting material.

Since a temperature-regulation medium can flow through the conduit 14, 16 in the interior 13 of the body 12 in order to regulate the temperature of at least a partial area of the shell face 07 of the barrel 02, the body 12 is advantageously arranged in the outer area of the barrel 02. If the temperature of the entire shell face 07 of the barrel 02 is to be regulated, the conduit 14, 16 of the body 12 advantageously extends over the entire length L of the barrel 02. The temperature of at least that partial area of the

shell face 07 of the barrel 02 is to be regulated, which corresponds to the area on the shell face 07 of the barrel 02 to be imprinted. As in the first exemplary embodiment, the rotating body 01 can again be a cylinder 01 conveying a material to be imprinted, or a roller 01 conveying a material to be imprinted.

A further advantageous embodiment of the body 12 consists in designing it in a cylindrical shape, i.e. to preferably match the length of the body 12 to the length L of the barrel 02. Therefore the body 12 preferably has the shape of a hollow cylinder, wherein the space enclosed by it can be filled with the material of the barrel 02. In this case the body 12 preferably encloses the longitudinal axis 06 of the rotating body 01. The conduit 14, 16 extending in the axial direction of the rotating body 01 can extend, similar to the example represented in Figs. 1 and 2, parallel in relation to the longitudinal axis 06 of the rotating body 01, or also helically in the outer areas of the barrel 02, or of the base body 17. If several conduits 14, 16 are provided in the body 12, the temperature-regulation medium can flow in opposite directions through adjoining conduits 14, 16.

In connection with the two embodiments of the proposed rotating body 01 described so far it has been assumed for the sake of simplicity, and without limiting the invention, that the rotating body 01 is homogeneously embodied, i.e. that the barrel 02 does not have a layered construction which extends concentrically to the shell face 07. Otherwise, a distinction would always have to be made between the barrel 02 and its base body 17, wherein the base body 17 and an outer body 19 enclosing it concentrically constitute the

barrel 02. Thus, the description is intended to apply to both embodiments.

Fig. 4 shows a third embodiment of the proposed rotating body 01 of a printing press. The barrel 02 of this rotating body 01 consists at least of a base body 17 with a cylindrical surface 18, wherein at least one outer body 19 is applied to the surface 18 of the base body 17, and the outer body 19 preferably consists of at least one curved piece, whose associated central angle α is less than 360° so that, in particular with a rotating body 01 embodied as a forme cylinder 01 or as a transfer cylinder 01, the outer body 19 in its cross section does not form a closed ring, but has at least a gap 20 which, for example in connection with a holding device not represented in Fig. 4, can be used for holding dressings applied to the rotating body 01. In connection with rollers which are not to be covered by a dressing, however, the outer body 19 can be designed as a closed ring, which encloses the base body 17 and is connected with the surface 18 of the latter. Alternatively to the above mentioned embodiment, it is also possible to apply several outer bodies 19 on the surface 18 of the base body 17, wherein the outer bodies 19 are arranged on the surface 18 of the base body 17 in the direction of the circumference U of the base body 17. In the latter case each outer body 19 consists of a curved piece, wherein the central angles α_i (i is a counting index for the curved pieces) belonging to the curved pieces complement each other to at most 360° . It is possible in particular to arrange two curved pieces symmetrically in respect to each other on the circumference U of the base body 17, wherein the central angle α_i (i is a

counting index for the curved pieces) of each curved piece preferably is a little less than 180° . Thus, curved pieces of the outer body 19 can be provided, for example, in the form of half shells or quarter shells. A gap 20 between the individual curved pieces of the outer body 19 can be a slit-shaped opening toward a clamping channel with the previously mentioned holding device, for example arranged in the base body 17, wherein the gap 20 can have a gap width of, for example, less than 3 mm, preferably 1 mm to 2 mm. In both cases of the last mentioned embodiment (Fig. 4), at least one hollow space 21 is provided in the outer body 19, wherein the hollow space 21 is open in the direction toward the surface 18 of the hollow body 17. The outer body 19 constitutes the outer component of the barrel 02, wherein the outer surface of the outer body constituting the shell face can be covered with one or two dressings, wherein the dressing or dressings are respectively held in place on the rotating body 01 by means of the holding device formed in the barrel 02, in particular in its base body 17, in a clamping channel. If the outer body 19 is embodied in several parts, preferably at least two curved pieces with a central angle α_i (i is a counting index for the curved pieces) of at most 180° , in the manufacture of the rotating body 01 the advantage is obtained that the base body 17 does not need to be inserted with an exact fit into the outer body 19, but that instead the curved pieces can be applied to the surface 18 of the base body 17 by means of a suitable releasable or non-releasable connecting technique, for example by screwing or welding.

As can be seen in Fig. 5, the rotating body 01 can also be designed in such a way that its barrel 02 consists at

least of a base body 17 with a cylindrical surface 18, wherein a hollow space 21, which is open toward the surface 18 of the base body 17, is provided in the base body 17, wherein an outer body 19 applied to the surface 18 of the base body 17 covers the hollow space 21, wherein the outer body 19 consists of a curved piece, whose associated central angle α is less than 360° . It is alternatively possible in this variation for the barrel 02 of the rotating body 01 to consist at least of a base body 17 with a cylindrical surface 18, wherein several hollow spaces 21, open toward the surface 18 of the base body 17, are provided in the base body 17, wherein several outer bodies 19 are arranged on the surface 18 of the base body 17 in the direction of the circumference U of the base body 17, and the outer bodies 19 applied to the surface 18 of the base body 17 cover the respective hollow spaces 21. In the latter case, every outer body 19 consists of a curved piece, wherein the central angles α_i (i is a counting index for the curved pieces) belonging to the curved pieces complement each other to at most 360° .

In connection with a rotating body 01 in accordance with the third exemplary embodiment (Figs. 4 and 5), namely a rotating body 01 consisting of a base body 17 with a solid outer body 19, which in particular is embodied not to be compressible and has a constant radial thickness d_{19} , applied to the base body 17, the outer body 19 can be glued, welded or screwed, for example, to the surface 18 of the base body 18. In accordance with this, the outer body 19 can be applied permanently or releasably to the surface 18 of the base body 17. Particularly suitable as welding methods are electron beam welding methods or laser beam welding methods.

In this case it can be sufficient for fastening the outer body 19 on the base body 17 if the outer body 19 is incorporated into the material or positively connected in the mentioned way with the surface 18 of the base body 17 only at the faces 11 of the barrel 02, so that a weld seam, for example, need not extend over the entire length L of the rotating body 01, but instead is provided only at some points, or formed at several short sections of only a few millimeters length and spaced-apart from each other. The welded sections can be, for example, 5 mm to 25 mm long, preferably approximately 10 mm, and are repeated at distances of 20 mm to 50 mm, preferably 30 mm to 40 mm, in the axial direction of the rotating body.

The rotating body 01 can be designed in such a way that at least the base body 17 - possibly together with journals 22, 23 for seating formed at the faces 11 of the barrel 02, and a drive mechanism of the rotating body 01 - is forged, or that at least the outer body 19 is made of steel. In connection with the preferred embodiment it is provided that a temperature-regulation medium for regulating the temperature of the shell face 07 of the barrel 02 flows through the hollow space 21, which for example can be cut by means of milling into the base body 17 or an inside 24 of the outer body 19. In this way the hollow space 21 constitutes a conduit 21 for the temperature-regulation medium, wherein the hollow space 21 is arranged in the barrel 02 in such a way that the access of beveled ends of dressings to be arranged on the shell face 07 of the barrel 02 to a clamping channel arranged in the customary manner in the base body 17 is not interfered with. A slit-shaped opening of a slit width S of

less than 3 mm on the shell face 07 of the barrel 02 and extending radially in respect to the rotating body 01 is sufficient for this access. Therefore the base body 17 and the outer body 19 are put together in such a way that they seal the hollow space 21. The hollow space 21 can be oriented axially in respect to the barrel 02, or it can extend in a meander-like shape along the length L of the barrel 02. If several hollow spaces 21 are provided, it is advantageous to arrange them at equal distances along the circumference U of the barrel 02. As in the previously described examples, the rotating body 01 can be a cylinder 01 which conveys a material to be imprinted, or a roller 01 conveying a material to be imprinted.

A variation of the third embodiment (Fig. 4, however, without the gap 20 in the outer body 19) relates to a rotating body 01 of a printing press, having a barrel 02, wherein the barrel 02 has at least a base body 17 with a cylindrical surface 18 and an outer body 19, which completely surrounds the surface 18 of the base body 17, wherein the rotating body 01 is distinguished in that on its inside 24 it has at least one conduit 21 which is open toward the surface 18 of the base body 17. In this case the outer body 19 preferably rests on the surface 18 of the base body 17. The outer body 19 and the base body 17 can be placed on each other by means of a press fit, for example. In connection with this embodiment with a ring-shaped outer body 19 closed in itself it is possible, depending on the requirements, to cut a gap 20 and an associated clamping channel, or also several gaps 20 and associated clamping channels, into the rotating body 01, preferably at a location where no conduit

21 is formed in the outer body 19, for example by means of a milling operation, following the application and fastening of the outer body 19 on or to the surface 18 of the base body 17. The gap 20 need not extend over the entire length L of the barrel 02, instead it can only extend over a portion of the length L of the barrel 02, so that the outer body 19 remains free of gaps, and therefore continuous, at least at the faces 11 of the barrel 02.

Regarding a fourth embodiment of the proposed rotating body 01 it is intended to first explain its manufacturing process. As can be seen in Figs. 6a and 6b, this process starts with a rotating body 01 of a printing press, having a barrel 02, wherein the barrel 02 has at least a base body 17 with a cylindrical surface 18 and an outer body 19, which can surround the surface 18 of the base body 17 at a distance a_{19} . The process is distinguished in that at least one strip 26 made of a material which can be liquefied by heating is attached to the inside 24 of the outer body 19 or on the surface 18 of the base body 17, that thereafter the outer body 19 and the base body 17 are assembled coaxially covering each other by preferably being pushed on top of each other, that thereafter a casting material which can harden is cast into a hollow space 27 remaining between the base body 17 and the outer body 19 - namely at a location where there is no strip 26 -, and that finally, after the casting material has hardened, at least the outer body 19 is heated in such a way that the material of the strip 26 is liquefied and removed from the space 27 between the base body 17 and the outer body 19. Here, the material of the strip 26 can be a plastic material or wax, for example. Synthetic resin, preferably a

two-component synthetic resin, which for example sets at room temperature or at a temperature of up to 100°C and hardens, is suitable as the casting material for filling the space 27 between the base body 17 and the outer body 19. The melting point of the casting material, which can lie for example at approximately 350°C, must in any case be higher than a melting point of the material of the strip 26, which can lie, for example, at 150°C. In this way it is provided that the outer body 19 is solidly connected with the base body 17 by means of the resin introduced into the space 27 between the base body 17 and the outer body 19. However, an aluminum foam which sets can also be used as an alternative to resin for filling the space 27.

After the at least one strip 26 arranged between the base body 17 and the outer body 19 has been removed, preferably thermally, after it has solidified or set the casting material adjoining the previous strip 26 forms a guide face 28 of a conduit 29, wherein the casting material placed into the space 27 seals the conduit 29 along its guide face 28 toward the base body 17 and toward the outer body 19. The strip 26 can extend over the length L of the barrel 02, preferably in its outer area, for example also helically. A radial extension of the strip 26, i.e. its height h₂₆, can be as large as the distance a₁₉ between the base body 17 and the outer body 19 (Fig. 6a). However, preferably the height h₂₆ of the strip 26 is made to be less than the distance a₁₉ between the base body 17 and the outer body 19 (Fig. 6b), so that the casting material forms a bottom on the surface 18 of the base body 17 when the space 27 between the base body 17 and the outer body 19 is filled. In both cases the height

h26 of the strip 26 corresponds to the height h26 of the conduit 29. If in the course of the operation of the rotating body 01 a temperature-regulation medium flows through the conduit 29 formed from the removable strip 26, the casting material forms a thermal insulating layer toward the base body 17, which is particularly effective if the conduit 29 has a bottom resting on the base body 17. The temperature-regulation medium is then only effective in the direction toward the outer body 19. The base body 17 remains protected against thermal effects. Thus, the casting material is used as an insulating material. To achieve this effect, a casting material with glass beads scattered in it, preferably hollow glass bodies, in particular hollow glass spheres, is particularly advantageous. In the same way it is advantageous to select an insulating material, i.e. a resin, whose thermal coefficient of expansion corresponds as well as possible to that of the material of the base body 17 and the outer body 19 and is therefore matched to it. Advantageously the outer body 19 and the base body 17 are concentrically aligned with each other in the course of being assembled.

In the fourth embodiment at least the barrel 02 of the rotating body 01 has a base body 17 with a cylindrical surface 18 and an outer body 19 surrounding the surface 18 of the base body 17 (Figs. 6a and 6b), wherein an interior diameter D19 of the outer body 19 is greater than an exterior diameter D17 of the base body 17, wherein the rotating body 01 is distinguished in that a casting material, preferably an insulating material, in particular a castable insulating material, is introduced into a space 27 between the surface 18 of the base body 17 and the inside 24 of the outer body

19, and the casting material, or the insulating material, forms at least one conduit 29 in the space 27. It is advantageous if the interior diameter D19 of the outer body 19 is greater by between 5 mm and 30 mm, in particular 20 mm, than the exterior diameter D17 of the base body 17, and if the outer body 19 is concentrically arranged around the base body 17. However, preferably the conduit 29 can extend helically around the base body 17 in the outer area of the barrel 02. Similar to the previous exemplary embodiments, a temperature-regulation medium can flow through the conduit 29. It is advantageous for the preferred use of the rotating body 01 if the outer body 19 is embodied as a steel tube, and the base body 17 is forged.

As represented in Fig. 7, a fifth embodiment provides a rotating body 01 with a barrel 02 of a printing press, wherein a shaft 31 of a diameter D31, which preferably extends through the barrel 02, is arranged centered in the barrel 02, wherein the shaft 31 has a higher resistance to mechanical stress on the rotating body 01, preferably a higher sturdiness, in particular a higher fatigue, breakage resistance or fatigue strength under reversed bending stress, than the barrel 02, and wherein at least one conduit 32 leading into the barrel 02 is provided in the shaft 31. Therefore the shaft 31 consists in particular of a high-strength material with a corresponding module of elasticity in order to provide in it a conduit 32 of a diameter D32 and with the greatest possible cross-sectional surface A32 in comparison with the cross-sectional surface A31 of the shaft 31 in the interior of the barrel 02, without impairing the sturdiness properties of the entire rotating body 01, such as

its fatigue, breakage resistance or fatigue strength under reversed bending stress, for example. Since the sturdiness properties of the material being used for the barrel 02, for example an iron-containing or aluminum-containing casting material, are not too great, it would not be possible to realize a conduit 32 with a large cross-sectional surface A32 for introducing as large as possible a volume flow of a temperature-regulation medium in the hub of the barrel 02 consisting of the same material as the remaining barrel 02, without impairing the sturdiness properties of the rotating body 01. However, the sturdiness of the material should permit the provision of a conduit 32 of a large cross-sectional surface A32. To form the conduit 32 in the shaft 31, an axial bore with the diameter D32 between 8 mm and 30 mm can be cut, wherein the diameter D32 is approximately 40% of the diameter D31 of the shaft 31. In this way the cross-sectional surface A32 of the conduit 32 can approximately be 20% or more of the cross-sectional surface A31 of the shaft 31. In spite of the formation of such a conduit 32 in the shaft 31, the geometric dimensions of the shaft 32 should remain unchanged in comparison with customary shafts 32, in particular they should not be increased; instead, under the same mechanical stress on the rotating body 01, the increased sturdiness of the shaft 32 compensates its weakening because of the conduit 32 cut into it. The conduit 32 is embodied on at least one front face 33 of the shaft 31 and extends in the barrel 02 for example only over a portion of the length L of the barrel 02. The shaft 31 itself, as a component which is homogeneously designed in respect to its structure and material and is of one piece, advantageously extends at least

over the length L of the barrel 02 wherein, as already mentioned, this length L can be up to 2400 mm. Furthermore, journals 22, 23 for seating and for connecting a drive mechanism for the rotating movement of the rotating body 01, can be formed at the ends of the shaft 31. A temperature-regulation medium for regulating the temperature of the barrel 02 is introduced in the conduit 32 in that a rotary transmission leadthrough is connected to the shaft 31, i.e. at least to one of its journals 22, 23. For the temperature regulation of the at least one shell face 07 of the barrel 02, on which at least one dressing can be placed for example, the barrel 02 has at least one conduit 29 extending underneath the shell face 07, wherein the conduit 29 of the barrel 02 is connected with the conduit 32 of the shaft 31 by means of at least one line substantially extending radially in respect to the barrel 02, for example a radial bore 34, or by means of an annular groove 37 represented in Fig. 2. In a preferred embodiment at least the barrel 02 is made, for example, of a casting material, wherein the conduit 29 of the barrel 02 is for example enclosed by the casting material of the barrel 02, or is embodied in accordance with one of the previously described embodiments of the rotating body 01. Therefore the barrel 02 can consist of gray cast iron, cast steel or cast aluminum, while the shaft 31 consists, for example, of preferably alloyed or quenched and drawn steel, in particular a high-strength steel with a corresponding module of elasticity, so that the rotating body 01 is constructed of two components, preferably of different materials, with different sturdiness properties and melting points differing from each other. The shaft 31 is introduced

into the barrel 02 with non-positive contact, material-to-material contact or positive contact, for example, and is connected with the barrel 02 in such a way that the conduits 29, 32 formed in the barrel 02 and the shaft 31 have a connection which is accessible to the temperature-regulation medium flowing through them. To the extent the stability of the shaft 31 permits, the shaft 31 can be cast into the barrel 02. However, in the preferred embodiment the cast barrel 02 is applied to the shaft 31 in particular by being shrunk onto it. Further possible joining techniques consist in gluing the barrel 02 in, or to clamp it by integral connection or by the insertion of suitable means, such as wedges, or a tongue-and groove connection, for example. In a method for producing the rotating body 01, wherein a shaft 31 with a conduit 32 of a large cross-sectional surface A32 is arranged centered in the barrel 02, and wherein the shaft 31 has been inserted into a barrel 02 produced by means of casting technology after it has set, the danger of a thermal deformation of the shaft 31, or at least of thermal stresses in the shaft 31, is avoided, which otherwise exists in particular in connection with slim rotating bodies 01 of a relatively small diameter D2 and a large axial length L in comparison therewith, as previously mentioned. With this method warming, or even heating through and softening of the shaft 31 by the liquefied casting material of the barrel 02 is avoided, since the shaft 31 is not enclosed by the casting material liquefied by heat, and instead the shaft 31 is inserted into the cast barrel 02 after it has set. This method contributes to the production of rotating bodies 01

with a shell face 07, which is to be temperature-regulated, of great dimensional accuracy.

A method for regulating the temperature of at least one barrel 02 of a rotating body 01 of a printing press, wherein at least the barrel 02 has at least one hollow body 03, 04, through which a preferably fluid temperature-regulation medium flows at a constant volume flow, or a conduit 14, 16, 21, 29 with an inflow 08 and an outflow 09 for the temperature-regulation medium, is provided, in that an amount of heat, which is to be exchanged between the barrel 02 and the temperature-regulation medium, is maintained constant by an accommodation of a flow velocity v_{08} , v_{09} of the temperature-regulation medium, which flows in the hollow body 03, 04, or conduit 14, 16, 21, 29 over a distance s between the inflow 08 and the outflow 09, wherein the distance s preferably corresponds to the length L of the barrel 02, but at least to the length of the area on the shell face 07 of the barrel 02 to be imprinted. An embodiment of the hollow body 03, 04, or conduit 14, 16, 21, 29 for this ensues from Fig. 8.

With this method it is possible to accommodate the flow speed v_{08} , v_{09} of the temperature-regulation medium by, for example, changing a cross-sectional surface A_{09} of the hollow body 03, 04, or the conduit 14, 16, 21, 29, at the outflow 09 in respect to a cross-sectional surface A_{08} of the hollow body 03, 04, or the conduit 14, 16, 21, 29, at the inflow 08. Or the flow speed v_{08} , v_{09} of the temperature-regulation medium can be accommodated in that a depth t_{09} of the hollow body 03, 04, or the conduit 14, 16, 21, 29, at the outflow 09

is changed in respect to the depth t_{08} of the hollow body 03, 04, or the conduit 14, 16, 21, 29, at the inflow 08. It is provided here, that a contact face A07 of the temperature-regulation medium flowing through the hollow body 03, 04, or the conduit 14, 16, 21, 29, directed to a shell face 07 is kept constant. By means of these measures it is achieved that the heat exchange between the shell face 07 of the barrel 02 and the temperature-regulation medium remains constant, because with a temperature-regulation medium which becomes steadily warmer because it cools the contact face A07, the flow speed v_{09} at the outflow 09 is reduced in comparison with the flow speed v_{08} at the inflow 08, so that the loitering length of the temperature-regulation medium at the contact face A07 is proportionally increased. It is also possible on the other hand to maintain the flow speed v_{08} , v_{09} of the temperature-regulation medium along the distance s constant and to change the contact face A07 of the temperature-regulation medium with the shell face 07 of the barrel 02 in that the geometry of the contact face A07, or its distance from the shell face 07 of the barrel 02, is changed.

With this sixth embodiment the rotating body 01 of a printing press has a barrel 02, wherein at least in the barrel 02 at least one hollow body 03, 04, or conduit 14, 16, 21, 29, through which a temperature-regulation medium flows, with an inflow 08 and an outflow 09 for the temperature-regulation medium is provided, in that an amount of heat, which is to be exchanged between the barrel 02 and the temperature-regulation medium along the distance s between the inflow 08 and the outflow 09 in the hollow body 03, 04,

or conduit 14, 16, 21, 29, is constant by an accommodation of a flow velocity v_{08} , v_{09} of the temperature-regulation medium. In this case the distance s advantageously corresponds at least to the area to be imprinted along the length L of the barrel 02.

As described in connection with the method, the flow velocity v_{08} , v_{09} of the temperature-regulation medium can be accommodated in that, for example, a cross-sectional face A_{09} of the hollow body 03, 04, or conduit 14, 16, 21, 29, at the outflow 09 is changed in comparison with a cross-sectional area A_{08} of the hollow body 03, 04, or conduit 14, 16, 21, 29, at the inflow 08. Or the flow speed v_{08} , v_{09} of the temperature-regulation medium can be accommodated in that a depth t_{09} of the hollow body 03, 04, or the conduit 14, 16, 21, 29, at the outflow 09 is changed in respect to the depth t_{08} of the hollow body 03, 04, or the conduit 14, 16, 21, 29, at the inflow 08. With this rotating body 01 a contact face A_{07} directed toward the shell face 07 of the temperature-regulation medium flowing through the hollow body 03, 04, or the conduit 14, 16, 21, 29, is not changed. The flow speed v_{08} , v_{09} of the temperature-regulation medium along the distance s can also remain constant, and the contact face A_{07} , which the temperature-regulation medium has toward the shell face 07 of the barrel 02, can be changed between the inflow 08 and the outflow 09 in its geometry or its distance from the shell face 07 of the barrel 02.

This sixth embodiment of the rotating body 01 is particularly suitable for designs wherein the inflow 08 and the outflow 09 of the temperature-regulation medium are arranged on the same face 11 of the barrel 02. The effect of

this sixth embodiment of the rotating body 01 can be achieved, for example, in that an insert, which changes the cross section along the distance s in a desired manner, is introduced in a hollow body 03, 04, or the conduit 14, 16, 21, 29, of a constant cross section, wherein this insert can be embodied wedge-shaped, for example. If the insert for the hollow body 03, 04, or the conduit 14, 16, 21, 29, is designed as a solid wedge, for example as a rod, in particular a plastic rod whose cross section is designed in the desired manner, this wedge can be introduced into the hollow body 03, 04, or the conduit 14, 16, 21, 29, by means of a material-to-material contact or of a positive connection, for example by gluing or by means of a press fit. The insert advantageously consists of an insulating material, preferably a castable insulating material, for example synthetic resin, advantageously with glass beads, preferably hollow glass spheres, scattered in it, which is preferably introduced into the hollow body 03, 04, or the conduit 14, 16, 21, 29, in a casting process or injection molding process, and which insulates the temperature-regulation medium against the base body 07 of the barrel 02 because of its thermal damping effect. The use of an insert has the advantage that the hollow body 03, 04, or the conduit 14, 16, 21, 29, in the barrel 02 of the rotating body 01 can be realized by means of a conventional tube, in particular a steel tube, or by drilling or milling, and that an action regarding the flow behavior of the temperature-regulating medium takes place in a processing step which is separate from the introduction of the hollow body 03, 04, or the conduit 14, 16, 21, 29, into the barrel 02. Moreover, it is

possible to provide a thermal insulation of the temperature-regulation medium in respect to the base body 17 in a simple manner by means of an insert into the hollow body 03, 04, or the conduit 14, 16, 21, 29.

List of Reference Symbols

01	Rotating body, cylinder, roller, forme cylinder, transfer cylinder
02	Barrel, hollow cylinder
03	Hollow body
04	Hollow body
05	-
06	Longitudinal axis
07	Shell face
08	Line
09	Line
10	-
11	Face
12	Body
13	Interior (12)
14	Conduit
15	-
16	Conduit
17	Base body
18	Surface (17)
19	Outer body
20	Gap
21	Hollow space, conduit
22	Journal
23	Journal
24	Inside (19)
25	-
26	Strip

27	Space
28	Guide surface
29	Conduit
30	-
31	Shaft
32	Conduit
33	Front face
34	Radial bore
35	-
36	Flange
37	Annular groove
a3, a4	Radial distance
a19	Distance
A07	Contact face
A08, A09	Cross-sectional surface
A13', A13"	Peripheral face
A31, A32	Cross-sectional surface
D2	Diameter
D3, D4	Interior diameter
D17	Exterior diameter
D19	Interior diameter
D31	Diameter
D32	Diameter
d19	Thickness
h26	Height of the strip, height of the conduit (29)
L	Length
S	Slit width
s	Distance

T08, t09	Depth
U	Circumference
v08, v09	Flow speed
α	Central angle
α_i	Central angle of the i^{th} curved piece, wherein i is the counting index